which has become unnecessary after etching, is also removed. By repetitively carrying out these steps, circuit patterns are multiplexedly formed on the wafer. If the manufacturing method of the present embodiment is used, it will be possible to manufacture semiconductor devices having a high degree of integration, which have heretofore been difficult to manufacture. --

IN THE CLAIMS:

Please AMEND claims 1, 6, and 12 as follows. A marked-up copy of these claims is attached in Appendix A. For the Examiner's convenience, all claims currently pending in this application have been reproduced below:

99 1. (Amended) An exposure apparatus comprising:

a projection optical system which projects a pattern of a first object to a second object by using an exposure beam in order to transfer the pattern from the first object onto the second object;

a diaphragm having an opening for the exposure beam in the center of said diaphragm, said diaphragm setting a numerical aperture of said projection optical system by adjusting the opening; and

a mechanism which keeps a temperature of said diaphragm substantially constant during an exposure operation by said projection optical system, said mechanism including a heat removing device located between the opening and an outer edge of the diaphragm.

2. An apparatus according to Claim 1, wherein said mechanism comprises a fluid circulation system, which is provided with said diaphragm, in which a temperature controlled fluid circulates.

3. An apparatus according to Claim 2, wherein said mechanism controls the temperature of said diaphragm to be almost the same as that of said projection optical system, during the exposure operation.

4. An apparatus according to Claim 3, further comprising a constant temperature system for said projection optical system, said constant temperature system providing the temperature controlled fluid to said mechanism.

5. An apparatus according to Claim 1, wherein said mechanism comprises a Peltier element.

9/10 6. (Amended) An apparatus according to Claim 1, further comprising a sensor which detects temperature information of said diaphragm and produces an output, wherein the temperature of said mechanism is controlled based on the sensor output.

7. An apparatus according to Claim 6, wherein said sensor is located at a position not being irradiated with the exposure beam.

8. An apparatus according to Claim 7, wherein said sensor is provided on said diaphragm, on a side facing the second object.

9. An apparatus according to Claim 1, wherein said diaphragm comprises an iris diaphragm.

10. An apparatus according to Claim 1, wherein said diaphragm comprises a turret having a plurality of openings.

11. An apparatus according to Claim 1, further comprising a reticle stage for holding a reticle as the first object, a wafer stage for holding a wafer as the second object, and said projection optical system comprises an illumination optical system.

Q11 12. (Amended) A micro-device manufacturing method comprising:

projecting, through a projection optical system, a pattern of a reticle to a wafer by using an exposure beam, in order to transfer the pattern from the reticle onto the wafer;

setting, using a diaphragm, a numerical aperture of the projection optical system by adjusting an opening for the exposure beam centered in the diaphragm;

keeping a temperature of the diaphragm substantially constant, during an exposure operation by the projection optical system, using a heat removal device located between the adjustable opening and an outer edge of the diaphragm; and

manufacturing a micro-device from the wafer.

13. A method according to Claim 12, wherein said keeping step comprses keeping the temperature of the diaphragm by circulating a fluid proximate to the diaphragm.

14. A method according to Claim 13, wherein the temperature of the diaphragm is kept to be almost the same as that of the projection optical system, during the exposure operation.

15. A method according to Claim 14, further comprising controlling temperature of the projection optical system as well as that of the diaphragm.

16. A method according to Claim 12, wherein said keeping step comprises keeping the temperature of the diaphragm using a Peltier element.

17. A method according to Claim 12, further comprising detecting temperature information of the diaphragm with a sensor, and controlling the temperature of the diaphragm based an output of the sensor.

18. A method according to Claim 17, further comprising providing the sensor at a location not being irradiated with the exposure beam.

19. A method according to Claim 18, further comprising providing the sensor on the diaphragm on a side facing the second object.

20. A method according to Claim 12, wherein the diaphragm comprises an iris diaphragm.

21. A method according to Claim 12, wherein the diaphragm comprises a turret having a plurality of openings.

22. A method according to Claim 12, wherein said manufacturing step comprises a resist process and a development process.